

edge of the body, with two intermediate rows of smaller blotches. There were also black marks at intervals along the dorsal and anal fins. The scales are considerably larger than in *A. laterna*, those in the middle of the upper side being 3.5 mm. in breadth. As in that species, the scales of the upper side have a single row of short spines along the posterior edge, while in those of the lower side the edge is entire.

8. Notes on Specimens in the Hume Collection of Birds.—
No. 6. On the Coraciidæ of the Indian Region, with
Descriptions of some new Species¹. By R. BOWDLER
SHARPE, F.L.S., &c.

[Received June 16, 1890.]

During the time that my friend Mr. Oates has been engaged in writing on the Passeres of the 'Fauna of British India,' I have refrained from publishing any critical notices of the Hume Collection. Since, however, every representation to the Government of India has failed in procuring for Mr. Oates the extension of leave from his duties in Burma, necessary for him to complete his work, which has therefore come to a standstill at the end of the Passeres, I feel myself at liberty to turn my attention once more to the study of the Hume Collection.

Since I wrote my last paper thousands of specimens have been registered and incorporated in the cabinets of the British Museum; and the superb series collected by Mr. Hume enables one to thoroughly work out every species of Indian bird; but it is surprising what a field still lies open for inquiry in the study of the Hume Collection. Witness the discovery that three species of *Eurystomus* have been confused under the heading of *E. orientalis*, to disentangle which confusion is one of the objects of the present paper.

As it is obviously impossible to publish a complete list of all the Hume specimens in the 'Proceedings,' and as they will shortly appear in their proper place in the 'Catalogue of Birds,' I have thought it best to try and condense my few remarks into the form adopted by Mr. Oates in his work, to which this paper may be taken as a supplement.

Fam. CORACIIDÆ.

The front plantar leading to the hallux. Well-defined lateral bare tracts on the neck. Spinal feather-tract forked on the upper back. Oil-gland nude or absent. (*H. Seebohm.*)

Subfam. CORACIINÆ.

There are two genera of *Coraciinæ* found in Africa and India. They consist of the brilliant Roller, commonly called the "Jay" by

¹ For No. 5, see P. Z. S. 1887, p. 470.

Anglo-Indians, and the Broad-billed Blue Roller, a much less familiar species.

Key to the Genera.

- a. Bill long and slender, compressed, much longer than it is broad..... CORACIAS, p. 547.
 b. Bill stout and depressed, as well as slightly hooked, as broad at gape as it is high EURYSTOMUS, p. 550.

On comparing the skulls of *Coracias* and *Eurystomus* the differences above noted will be found to be emphasized, the skull being everywhere broader and more massive, and especially remarkable for its very broad palatine bones. The nasal aperture is apparently linear in *Coracias*, and triangular in *Eurystomus*.

As with other Picarian birds, the Rollers nest in holes of trees or buildings and lay white eggs. They get their name of "Roller" from their peculiar flight; but the broad-billed *Eurystomi* are more forest-loving, and by no means such birds of the open as the species of *Coracias*.

Genus CORACIAS, Linnæus, 1766.

Three species of *Coracias* occur in the Indian Region, all of them well represented in Mr. Hume's collection. There appears to be very little doubt that *C. indica* and *C. affinis* interbreed on the confines of their respective ranges, and this is probably one of the few absolutely indisputable instances of hybridization between birds taking place in a state of nature. Dr. Jerdon and Mr. Blyth also speak of the crossing of *C. indica* with *C. garrula* in the extreme North-west, but I have not seen any instance of this phenomenon exhibited in the Hume series.

Key to the Species.

- a. With a subterminal band of silvery blue on the quills.
 a'. Tail with a broad terminal band of purplish blue; upper tail-coverts purplish blue, darker than the rump..... *indica*, p. 547.
 b'. Tail with no terminal band, though occasionally a blackish spot at the end of the feathers is present; upper tail-coverts light silvery blue, paler than the rump *affinis*, p. 548.
 b. With no subterminal blue band on the quills, the basal part only being light; primary-coverts silvery blue; back light bay *garrula*, p. 549.

1. CORACIAS INDICA. *The Indian Roller.*

Coracias indica, Linn. Syst. Nat. i. p. 157; Blyth, Cat. p. 51; Horsf. & Moore, Cat. ii. p. 571; Jerd. B. I. i. p. 214; Gould, B. Asia, i. pl. 54; Hume, Cat. no. 123; Legge, B. Ceyl. p. 281.

Coloration. Base of forehead and lores sandy white; head greenish blue, with a wash of bright blue over the eye; round the hind neck a collar of lilac-rufous; back drab, washed with oily green; lower back and rump bright blue; upper tail-coverts purplish blue; wing-coverts greenish blue, as well as the base of the quills; lesser coverts purplish blue; remainder of quills purplish blue, the primaries with a subterminal band of bright blue; inner secondaries

like back; centre tail-feathers green, the remainder silvery blue, with a purplish-blue base and a band of the same colour at the tip; chin and base of cheeks white; sides of face, throat, and breast lilac-brown, purplish on the throat, which is streaked with white; remainder of under surface light blue. "Bill blackish brown, paler at base of lower mandible; inside of mouth pale greenish yellow; feet brownish yellow; eyelid and naked skin round the eye pale gamboge; iris greyish brown" (*E. A. Butler*).

Length about 12 inches, tail 5, wing 7·3, tarsus 0·95, bill from gape 1·7.

The specimens from Southern India are rather darker and more richly coloured than the birds of the North-western plains, those from the N.W. Provinces being decidedly lighter in colour.

Distribution. Nearly the whole of India and Ceylon, not ascending the hills. It extends from Asia Minor to Persia, Northern Arabia, and Baluchistan, and thence over the greater part of the plains of India. Its range extends to the Nepal Valley, where Dr. Scully procured authentic specimens, and here it meets with *C. affinis* from Assam, and intermediate specimens occur in which the strain of *C. indica* predominates. Its eastern limit appears to be Dacca and the vicinity of Calcutta, where intermediates between it and *C. affinis* again occur rather frequently. Over Central and Southern India it is likewise generally spread, but it is apparently not nearly so plentiful as in Upper India; and in the Deccan it is migratory, retiring to the better-wooded tracts to breed, according to Colonel Butler and the Rev. S. B. Fairbank.

Habits, &c. Breeds from the end of March right into July according to Hume, who also states that in Upper India the great majority of the birds lay in April and June. The Indian Roller, like its congeners, nests in holes, sometimes making a considerable nest of feathers, grass, &c. The situation chosen is the hole of a tree or old walls, or in roofs and under the eaves of bungalows. The eggs are white, and measure from about 1·3 inch in length by about 1·06 inch in breadth.

CORACIAS AFFINIS. The Burmese Roller.

Coracias affinis, McClell. P. Z. S. 1839, p. 164; Blyth, Cat. p. 51 (1849); Horsf. & M. Cat. ii. p. 574 (1856); Jerd. B. I. i. p. 217 (1862); Godw.-Aust. J. A. S. B. xxxix. p. 95 (1873); Blyth & Wald. B. Burm. p. 72 (1875); Hume & Davis. Str. F. vi. p. 72 (1878); Anders. Yunnan Exped., Aves, p. 581 (1878); Hume, Cat. no. 124; Oates, B. B. ii. p. 69 (1883); Salvad. Ann. Mus. Genov. (2) iv. p. 589 (1887); Hume, S. F. xi. p. 48 (1888).

Coloration. Upper surface dingy olive-brown; lower back and rump purplish blue, but the upper tail-coverts silvery cobalt; wings and tail as in *C. indica*, excepting that there is no blue terminal band to the latter, the outer feather alone having a black spot at the end; crown of head greenish blue, with a lighter and more verditer-blue shade on the forehead and eyebrow; sides of face and throat and breast brown, becoming paler on the latter; chin

greenish white; throat streaked with lilac-blue; abdomen and under tail-coverts light cobalt; thighs purplish blue. "Bill dark brownish black; mouth yellow; edges of the eyelids, lores, and skin at the back of the eye yellowish orange; iris brown; legs yellowish brown; claws black" (Oates).

Length about 12 inches, tail 4·7, wing 7·6, tarsus 1, bill from gape 1·75.

Distribution. From Nepal to Darjiling and Bhutan, thence throughout Assam and Cachar as far west as Dacca and the neighbourhood of Calcutta. It is spread all over Burma and Tenasserim, except in the extreme south, and ranges eastwards to Siam and Cochin China. Specimens in the Hume Collection from Nepal (*J. Scully*), Native and British Sikhim (*L. Mandelli*), Tippera, and Calcutta are apparently hybrids between the present species and *Coracias indica*, and belong to the intermediate form which I call *Coracias indica affinis*.

Habits, &c. Similar to those of *C. indica*. Mr. Oates has found the bird breeding in Pegu in March and April. The eggs are glossy white, four or five in number, laid on the bare wood at the bottom of large natural hollows in decayed branches of large trees. The average of twelve eggs was 1·37 inch by 1·09.

3. CORACIAS GARRULA. *The Common Roller.*

Coracias garrula, Linn. S. N. i. p. 159 (1766); Horsf. & M. Cat. ii. p. 570 (1856); Hume, N. & E. p. 104 (1813); Hume, Cat. no. 125; Bidd. Ibis, 1881, p. 48; Scully, t. c. p. 429; C. Swinh. Ibis, 1882, p. 102. —

Coloration. Upper surface light cinnamon, including the scapulars and inner secondaries; lower back and rump dark ultramarine; upper tail-coverts greenish blue washed with ultramarine; wing-coverts round the bend of the wing ultramarine; rest of the coverts greenish blue, as well as the base of the quills; bastard-wing green, blue at the end; primary-coverts greenish blue with a dark blue tip; remainder of quills black; two centre tail-feathers dull greenish; remainder of the feathers dark blue, externally green and internally black, all the feathers light silvery blue near the ends, the outermost with a black terminal spot; crown, sides of head, and under surface of body pale greenish blue, the base of the forehead and the chin white; the throat and chest as well as the sides of the face streaked with silvery green.

Young birds are much duller in colour than the adults, and have the breast pervaded with a brown shade. Although no difference can be found between adult Rollers from Europe and those from Cashmere, the young specimens from the latter locality and N.W. India are generally much paler than European birds of similar age.

Distribution. The European Roller extends from Southern and Central Europe through Persia to Afghanistan, where it breeds, as well as in Cashmere. In the autumn it visits various parts of North-western India, occurring regularly in the vicinity of Simla, and specimens are in the Hume Collection from Masuri and Gurbhal.

Genus EURYSTOMUS, Vieill., 1816.

The Broad-billed Rollers inhabit Africa, Madagascar, and the greater part of the Indian and Australian regions. One species ranges as high as Manchuria and Eastern Siberia.

The habits of these birds differ considerably from those of the true Rollers (*Coracias*). They affect the forests rather than the open country, and are of a sluggish nature during the daytime, becoming active in pursuit of food in the morning and evening only.

A curious consensus of opinion is expressed by writers on Indian ornithology that there is only one species of *Eurystomus* occurring within Indian limits, and that specimens from the Malay Archipelago are identical with those from the Indian Peninsula; but after a careful examination of the series in the Hume Collection, there appears to be no doubt that there are *three* Indian species, each with well-defined characters and a definite range.

Key to the Species.

- a. Terminal half of tail entirely black, not shaded with purplish blue.
- a'. Larger; under surface decidedly greenish; head brownish black; secondaries black with no blue shade externally *orientalis*, p. 550.
- b'. Smaller; under surface decidedly blue; head black; secondaries black, washed with purplish blue near the base of the outer web *letior*, p. 551.
- b. Terminal half of the tail black, but conspicuously washed with purplish blue *calonyx*, p. 551.

1. EURYSTOMUS ORIENTALIS.

Coracias orientalis, Linn. S. N. i. p. 159 (1766).

Eurystomus orientalis (Linn.), Steph. Gen. Zool. vii. p. 403 (1809); Horsf. & M. Cat. i. p. 121 (1854); Hume, S. F. ii. p. 164 (1874); Blyth & Wald. B. B. p. 72 (1875); Hume & Davison, S. F. vi. p. 72 (1878); Hume, Cat. no. 126 (pt.); Oates, B. B. ii. p. 70 (1883).

Coloration. Bluish green, the wing-coverts and scapulars a little brighter than the back, as also the inner secondaries; head blackish brown, the hind neck, sides of head, and sides of neck brown and washed with green; under surface of body greenish blue, duller on the fore neck and chest; the throat violet-blue, each feather with a mesial streak of brighter blue; primary-coverts black, with a narrow edging of purplish blue; quills black, the primaries purplish blue at the base, followed by a subbasal band of silvery blue, which is again succeeded by a purplish shade; most of the secondaries entirely black, some of the inner ones with a slight edging of purplish blue; tail black, with a purplish and blue shade near the base.

Bill, legs, and feet dull vermilion, the tip of the bill black; iris dark brown; gape yellowish.

Length about 11.5 inches, tail 4.1, wing 7.4, tarsus 0.65, bill from gape 1.45.

Distribution. Locally distributed over the Burmese provinces, extending as far north as Cachar, and southward through Tenasserim and the Malayau Peninsula to Sumatra, Java, Borneo, and the Philippines. Major Wardlaw-Ramsay records the species from the Karen Hills, but as no specimens were preserved it is possible that the bird there noticed was *E. calonyx*. It is also found in the Andamans, the birds from this locality being remarkable for a somewhat larger bill.

2. EURYSTOMUS LÆTIOR, sp. n.

Eurystomus orientalis (nec L.), Vipan, S. F. i. p. 495 (1873); Morgan, S. F. ii. p. 531 (1874); Hume, S. F. iv. p. 382 (1876); Legge, B. Ceylon, p. 285 (1878); Davison, S. F. x. p. 351 (1883).

Coloration. Similar to *E. orientalis*, and, like that species, having the end of the tail black without any mark of purplish blue. Differs in its somewhat smaller size, blacker head, brighter blue under surface, and also in having the black secondaries washed with purplish blue near the base of the outer web.

Bill deep orange-red, the tip of the upper mandible black; orbital skin red; tarsi and feet orange-red; feet dusker than the tarsus; iris hazel-brown.

Length about 11 inches, tail 4, wing 7·8, tarsus 0·65, bill from gape 1·5.

Distribution. The forests of Malabar (where Mr. R. W. Morgan procured specimens at Nellumbore) and the Nilghiris. It breeds in the Travancore Hills, but, according to Mr. Bourdillon, it is apparently not a resident. In Ceylon it is an extremely rare bird, and but few instances of its occurrence are recorded by Colonel Legge.

Habits. Mr. Bourdillon found a pair breeding in Travancore, where they ejected a pair of Mynahs (*Eulabes religiosa*) from their hole in a tree-stump at about 40 feet from the ground. The eggs are like those of the Indian Roller, but are somewhat larger, very broad ovals, pure white and fairly glossy (*Hume*).

3. EURYSTOMUS CALONYX.

Eurystomus calonyx, Hodgs. in Gray's Zool. Misc. p. 82 (*nom nudum*).

Eurystomus orientalis (nec L.), Hodgs. t. c. p. 82 (1844); Gray, Cat. Hodgs. Coll. p. 55 (1846); Blyth, Cat. p. 51 (1849); Jerd. B. Ind. i. p. 219 (1862); Hume, N. & E. p. 105 (1873); id. Cat. no. 126 (pt.).

Coloration. Similar to *E. orientalis*. Differs in having the end of the tail black washed with purplish blue, and the whole of the black secondaries also washed with purplish blue. "Bill and feet coral-red; iris red" (*W. E. M. James*).

Length 11 inches, tail 3·9, wing 7·4, tarsus 0·75, bill from gape 1·45.

Distribution. Extends throughout the Himalayan Terai from

Kumaon to Darjiling and Upper Assam, probably breeding throughout the whole of this range. Mr. Thompson states that they are found from the Sardah to the Ganges, but particularly abound in the Kotree Doon. The species is also found in summer in Eastern Siberia and Northern China, and it appears to winter in Southern Tenasserim and the Malayan Peninsula, specimens being in the Hume Collection from Copah, Malacca, Pulo Seban, and the native State of Kuroo near Malacca. It is probably this species which Jerdon believed to winter in Central India.

Habits, &c. Arrives, according to Mr. Thompson, in the Terai below Kumaon in April, breeding in May and finally leaving the forests in July and August. They breed in the loftiest sâl trees in holes in the higher branches (never less than 50 feet from the ground), and they are confined to the sâl forests.

Although this species has never yet been described and its differences from *E. orientalis* pointed out, I have thought it best to adopt Hodgson's name. This has before now been quoted, but only as a synonym of *E. orientalis*, which is the black-tailed bird.

While on the subject of the Eastern *Eurystomi*, I may point out that the Roller of the Solomon Islands, usually identified with *E. crassirostris*, is a distinct species, entirely wanting the black tip to the culmen which is found in all the other *Eurystomi*. Although originally supposed to come from the Solomon Islands, there is no doubt that the type specimen of *E. crassirostris* came from New Ireland, like many other birds out of the same collection. I have not seen the type specimen recently, but it is distinctly described by Count Salvadori as having a black-tipped culmen, and I therefore call the allied bird from the Solomons

EURYSTOMUS SOLOMONENSIS, sp. n.

E. similis *E. crassirostri*, sed rostro omnino rubro, culmine minime nigro terminato distinguendus. Long. tot. 12.0, culm. 1.45, alae 7.7, caud. 5.2, tarsi 0.7.

Hab. in insulis Solomonensibus.

9. On a Collection of Lepidoptera made by Mr. Edmund Reynolds on the Rivers Tocantins and Araguaya and in the Province of Goyaz, Brazil. By EMILY MARY SHARPE. (Communicated by R. BOWDLER SHARPE, F.Z.S.)

[Received June 16, 1890.]

(Plate XLVI.)

It has seemed to me to be worth while that a record should be preserved of the collection of Butterflies made by Mr. Reynolds during his adventurous journey on the Araguaya. The collection was made with great care; and, as I believe that no naturalist has